2153 AF/8

Docket No.: 64965-124 **PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of :

Jeffrey DWORK, et al. :

Serial No.: 09/482,327 : Group Art Unit: 2153

Filed: January 14, 2000 : Examiner: Kevin. S. Parton

For: AUTOMATIC GENERATION OF FLOW CONTROL FRAMES

TRANSMITTAL OF APPEAL BRIEF

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Submitted herewith in triplicate is Appellants' Appeal Brief in support of the Notice of Appeal filed June 5, 2003. Please charge the Appeal Brief fee of $320.00 to Deposit Account 500417.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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APPEAL BRIEF

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P.O. Box 1450
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Sir:

This Appeal Brief is submitted in support of the Notice of Appeal filed June 5, 2003.

I. REAL PARTY IN INTEREST

The real party in interest is Advanced Micro Devices, Inc., the assignee of the entire right, title and interest in and to the above-identified U. S. Application.

II. RELATED APPEALS AND INTERFERENCES

No other appeals or interferences are known to the Appellant, which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1 and 4-21 are pending. Claims 2 and 3 are cancelled. Claims 1 and 4-21 stand under final rejection, from which rejection this appeal is taken.

IV. STATUS OF AMENDMENTS

The claims have not been amended after final Office Action. Further, as indicated in the Advisory Action of May 12, 2003, the Amendment to the specification filed under 37 CFR 1.116 will be entered for purposes of appeal.

V. SUMMARY OF INVENTION

The present invention is directed to an automatic flow control mechanism that supports two modes of automatic flow control in a network interface. As shown in FIG. 2 of the drawings and described on pages 5-10 of the specification, the automatic flow control mechanism comprises a CPU read pointer register 102 for storing a copy of a read pointer maintained by a host CPU 60 coupled to the network interface 10 via the bus 12. This read pointer indicates the next descriptor that the host CPU 60 should process after it reads the current receive buffer.

Also, the automatic flow control mechanism of the present invention includes a congestion detection enable register 104, and a flow control mode register 106. The congestion detection enable register 104 contains a congestion detection enable bit that must be set to enable automatic generation of flow control frames. The flow control mode register 106 contains a flow control mode bit used to select one of two flow control modes provided in the network interface 10. In the first flow control mode, when the network interface 10 detects a shortage of buffers for holding received data, it automatically requests the link partner to suspend data transmission until the required number of

receive buffers is available. In the second flow control mode, the network interface 10 automatically requests the link partner to suspend data transmission for a predetermined time.

The automatic flow control mechanism is based on calculating the number of available descriptors pointing to buffers allocated for storing received data. For example, the receive buffers may be arranged in a system memory 70. Descriptors that contain such information as the start address and length of the corresponding buffers may be maintained in selected structures of the system memory 70 having fixed addresses.

Further, the automatic flow control mechanism comprises a free descriptor high threshold register 108 and a free descriptor low threshold register 110 for storing high and low programmable threshold values, respectively, used in the automatic flow control procedure, and a pause value register 112 and a pause timer 114, which are programmable registers used in the second flow control mode.

In the first flow control mode, the network interface 10 periodically compares the number of available receive descriptors with low and high threshold values. When the number of available receive descriptors falls below the low threshold value, the network interface 10 sends a PAUSE frame requesting the link partner to suspend its transmission (in a full-duplex mode), or enables the back pressure mechanism (in a half-duplex mode). When the number of available receive descriptors rises above the high threshold value, the network interface sends a PAUSE frame requesting the link partner to resume its transmission (in a full-duplex mode), or disables the back pressure (in a half-duplex mode). In the second flow control mode, when the network interface detects that the number of available receive descriptors is less than the low threshold value, it transmits a PAUSE frame requesting the link partner to suspend its transmission for a time period corresponding to a preprogrammed pause value (in a full-duplex mode), or enables the back pressure mechanism, at least, for a time interval defined by a pause timer loaded with the preprogrammed pause value (in a half-

duplex mode).

VI. ISSUES

Whether claim 1 is unpatentable over Chong et al. in view of Ramakrishnan under 35 U.S.C. 103.

Whether claims 4-11 are unpatentable over Chong et al. in view of Ramakrishnan and Fox under 35 U.S.C. 103(a).

Whether claims 12-17, 19 and 20 are unpatentable over Chong et al. in view of Fox under 35 U.S.C. 103(a) as being.

Whether claims 18 and 21 are unpatentable over Chong et al. in view of Ramakrishnan and Fox under 35 U.S.C. 103(a).

VII. GROUPING OF CLAIMS

Appellant submits that the claims of each rejected group do not stand or fall together. The claims being considered to be separately patentable for the reasons presented in the Argument section of this Brief.

VIII. THE ARGUMENT

In the application of a rejection under 35 U.S.C. §103, it is incumbent upon the Examiner to factually support a conclusion of obviousness. As stated in ***Graham v. John Deere Co.*** 383 U.S. 1, 13, 148 U.S.P.Q. 459, 465 (1966), obviousness under 35 U.S.C. §103 must be determined by considering (1) the scope and content of the prior art; (2) ascertaining the differences between the prior art and the claims in issue; and (3) resolving the level of ordinary skill in the pertinent art.

As demonstrated below, the Examiner has failed to ascertain the differences between the prior

art and the claims in issue.

REJECTION OF CLAIM 1

Claim 1 recites a computer system that comprises:

-a local bus,

-a host processor coupled to the local bus,

-a network interface for providing an interface between the local bus and a network medium, and

-a memory coupled to the local bus, the memory having receive buffers allocated for receiving data from the network medium.

The network interface includes an automatic flow control mechanism for automatically controlling a flow of data from the network medium based on availability of the receive buffers.

In a first flow control mode initiated when a flow control mode signal is at a first logic level, the automatic flow control mechanism is configured to respond to a shortage of the receive buffers by automatically requesting a remote transmitter coupled to the network medium to suspend data transmission until a predetermined number of the receive buffers is available.

In a second flow control mode initiated when the flow control mode signal is at a second logic level, the automatic flow control mechanism is configured to respond to a shortage of the receive buffers by automatically requesting the remote transmitter coupled to the network medium to suspend data transmission for a predetermined time.

The Examiner admits that Chong does not disclose the claimed second flow control mode initiated when the flow control mode signal is at a second logic level.

Ramakrishnan is relied upon for disclosing a flow control mechanism configured to respond to a shortage of the receive buffers by automatically requesting the remote transmitter coupled to the

network medium to suspend data transmission for a predetermined time.

Considering the references, neither Chong nor Ramakrishnan discloses the claimed arrangement for controlling modes of operation in a flow control mechanism that enables the computer system to select one of two ways of responding to a shortage of the receive buffers. In a first flow control mode initiated when a flow control mode signal is at a first logic level, the automatic flow control mechanism is configured to automatically request a remote transmitter coupled to the network medium to suspend data transmission until a predetermined number of the receive buffers is available. In a second flow control mode initiated when the flow control mode signal is at a second logic level, the automatic flow control mechanism is configured to automatically request the remote transmitter coupled to the network medium to suspend data transmission for a predetermined time.

It is well settled that the test for obviousness is what the combined teachings of the references would have suggested to those having ordinary skill in the art. ***Cable Electric Products, Inc. v. Genmark, Inc.***, 770 F.2d 1015, 226 USPQ 881 (Fed. Cir. 1985). In determining whether a case of prima facie obviousness exists, it is necessary to ascertain whether the prior art teachings appear to be sufficient to one of ordinary skill in the art to suggest making the claimed substitution or other modification. ***In re Lalu***, 747 F.2d 703, 705, 223 USPQ 1257, 1258 (Fed. Cir. 1984).

As demonstrated above, the combined teachings of the references are not sufficient to one skilled in the art to suggest **controlling a mode of operation** of a flow control mechanism in the manner required in claim 1.

The Examiner takes the position that it would have been obvious to modify Chong et al. "by employing the use of timer to determine when transmission from the transmitting node can resume." This assertion is respectfully traversed.

The Examiner should recognize that the fact that the prior art *could* be modified so as to result

in the combination defined by the claims would not have made the modification obvious unless the prior art suggests the desirability of the modification. ***In re Deminski***, 796 F.2d 436, 230 USPQ 313 (Fed. Cir. 1986). In the absence of such a prior art suggestion for modification of the references, the basis of the rejection is no more than inappropriate hindsight reconstruction using appellant's claims as a guide. ***In re Warner***, 379 F.2d 1011, 154 USPQ 173 (CCPA 1967).

Appellant respectfully submits that the Examiner has improperly applied hindsight as a basis for a holding of obviousness. Recognizing, after the fact, that a modification would provide an improvement or advantage, without suggestion thereof by the prior art, rather than dictating a conclusion of obviousness, is an indication of improper application of hindsight considerations. Simplicity and hindsight are not proper criteria for resolving obviousness. It is only the Appellant's disclosure that discloses an arrangement for controlling modes of operation in a flow control mechanism that enables the computer system to select one of two ways of responding to a shortage of the receive buffers. Therefore, the Examiner's conclusion of obviousness is based on the Appellant's disclosure rather than on the prior art suggestion.

Considering Chong et al., the reference discloses multiple ports interfacing to the bus via respective high-speed Bus Interface Chips (BICs). The object of the invention is "to provide a **simple** flow control mechanism **by which congestion status of BICs receiving multicast streams may be determined** and which may be appropriately used to de-control the sender" (col. 2, lines 59-62).

It is respectfully submitted that the congestion status of BICs receiving multicast streams cannot be determined by automatically requesting the remote transmitter to suspend data transmission for a predetermined time. Therefore, Chong et al. does not need the modification suggested by the Examiner.

Moreover, by discussing disadvantages of requiring retransmission of data at a later time (see col. 2, lines 50-53), Chong et al. expressly **teaches away** from the claimed invention, thereby constituting further **evidence of nonobviousness**. ***In re Bell***, 991 F.2d 781, 26 USPQ2d 1529 (Fed. Cir. 1993); ***In re Hedges***, 783 F.2d 1038, 228 USPQ 685 (Fed. Cir. 1986); ***In re Marshall***, 578 F.2d 301, 198 USPQ 344 (CCPA 1978).

Accordingly, the Examiner's conclusion of obviousness with respect to claim 1 is not warranted, and the rejection of claim 1 under 35 U.S.C. 103 is improper.

REJECTION OF CLAIMS 4-11

Claims 4-11 depend from claim 1 and are defined over the prior art at least for the reasons presented above in connection with claim 1.

Moreover, the combined teachings of the applied references are not sufficient to suggest:

-a descriptor management unit for managing receive descriptors pointing to the receive buffers to detect availability of the receive buffers by monitoring the number of available descriptors pointing to the receive buffers available for receiving data from the network medium. (as claims 4 and 5 require);

-the automatic flow control mechanism configured to automatically request the remote transmitter to suspend data transmission when the number of available descriptors falls below a first threshold value (claim 6);

-the automatic flow control mechanism configured to enable the remote transmitter to resume data transmission when the number of available descriptors rises above a second threshold value higher than the first threshold value (claims 7 and 8);

-the automatic flow control mechanism configured to automatically request the remote transmitter to suspend data transmission when the number of available descriptors falls below a

preprogrammed threshold value (claim 9);

-the automatic flow control mechanism configured to enable the remote transmitter to resume data transmission after a preprogrammed time interval, if the number of available descriptors is not less than the preprogrammed threshold value (claim 10); and

-the network interface configured to store information indicating a read pointer of the host processor that points to a next descriptor that should be processed by the host processor after a current receive buffer is read by the host processor (claim 11).

The Examiner admits that neither Chong nor Ramakrishnan discloses the details recited in claims 4-11. He relies upon Fox for disclosing the subject matter of these claims.

However, Fox does not teach or suggest descriptor management schemes for detecting availability of the receive buffers, and operating the automatic flow control mechanism in the manner required by claims 4-11.

Accordingly, the applied combination of references is not sufficient to arrive at the inventions recited in claims 4-11. Hence, the rejection of claims 4-11 under 35 U.S.C. 103 is improper.

REJECTION OF CLAIMS 12-17, 19 AND 20.

Independent claim 12 recites a network interface device for providing an interface between a data network and a computer system, the network interface device comprising:

-a descriptor management unit for managing receive descriptors pointing to receive buffers allocated to receive data from the network medium, and

-an automatic flow control mechanism for automatically performing flow control in accordance with the number of available receive descriptors pointing to the receive buffers available for receiving data from the network medium.

The Examiner admits that Chong et al. does not disclose:

-a descriptor management unit for managing receive descriptors pointing to receive buffers allocated to receive data from the network medium, and

-an automatic flow control mechanism for automatically performing flow control in accordance with the number of available receive descriptors pointing to the receive buffers available for receiving data from the network medium.

Fox is relied upon for disclosing the claimed elements.

However, Fox does not describe automatically performing flow control in accordance with the number of available receive descriptors pointing to the receive buffers available for receiving data from the network medium. Instead, this reference discloses that when hardware receive descriptors are filled, incoming data cannot be received. In this case, a buffer descriptor overflow error occurs, an error counter is incremented and the error is reported to a fault management system (col. 7, lines 5-15).

In the Advisory Action of May 12, 2003, the Examiner appears to agree that Fox does not disclose the claimed features. The Examiner states that "[t]he Fox reference is used to show the utility of descriptors in buffer management."

It is respectfully submitted that "the utility of descriptors in buffer management" suggested by Fox is not sufficient to modify Chong et al. to arrive at the subject matter claimed in claim 12. In particular, the combination of Chong et al. with Fox would not suggest the claimed automatic flow control mechanism for automatically performing flow control in accordance with the number of available receive descriptors pointing to the receive buffers available for receiving data from the network medium.

Moreover, the Examiner must provide reasons why one having ordinary skill in the art would have been led to modify the prior art or to combine prior art references to arrive at the claimed invention. ***Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.***, 776 F.2d 281, 227 USPQ 657 (Fed.

Cir. 1985). ***In re Fine***, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); ***Stratoflex, Inc. v. Aeroquip Corp.***, 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983); ***In re Warner***, 379 F.2d 1011, 154 USPQ 173 (CCPA 1967). These showings by the Examiner are an essential part of complying with the burden of presenting a *prima facie* case of obviousness. ***In re Oetiker***, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).

The Examiner has failed to provide the requisite reasons for modifying Chong et al. and thus to establish a *prima facie* case of obviousness. In particular, the Examiner contends that it would have been obvious to modify Chong et al. "by employing the use of descriptors to monitor the available buffers... This benefits the system by making the changing of threshold and time values central for all buffers instead of requiring that it be done for each individual buffer."

However, by discussing disadvantages of sophisticated flow control schemes that are too complicated to be implemented at the BIC level (col. 2, lines 45-58), Chong et al. teaches away from the central control suggested by the Examiner.

Moreover, Chong et al. discloses a hybrid flow control mechanism combining physical control for unicast streams and logical control for multicast streams, in order to maintain negligible loss, high throughput and fair bandwidth sharing (col. 3, lines 3-21). It is respectfully submitted that one skilled in the art of data telecommunications would recognize that the descriptor management suggested by the Examiner would make it impossible to provide the physical control for unicast streams.

It is well settled that if proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. ***In re Gordon***, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). Hence, there is no suggestion or motivation to modify Chong et al. in view of Fox "by employing the use of descriptors to monitor the available buffers," as the Examiner suggests.

Independent claim 19 recites a method of automatic flow control in a network interface between a data network and a computer system. The method comprises the steps of:

-monitoring the number of receive descriptors pointing to buffers in the computer system available for receiving data from the network, and

-automatically requesting a remote station in the data network to suspend data transmission when the number of receive descriptors falls below a first preprogrammed threshold level.

As discussed above, neither Chong nor Fox teaches or suggests automatically requesting a remote station in the data network to suspend data transmission when the number of receive descriptors falls below a first preprogrammed threshold level.

Hence, a combination of these references is not sufficient to suggest the invention recited in claim 19. Moreover, as discussed above, there is no suggestion or motivation to make the modification proposed by the Examiner.

Dependent claims 13-17 and 20 are defined over the prior art at least for the reasons presented above in connection with respective independent claims 12 and 19. Moreover, the applied reference combination is not sufficient to suggest the following features of these claims:

-the automatic flow control mechanism configured to automatically request a remote station in the data network to suspend data transmission when the number of available descriptors falls below a first threshold value (claim 14);

-the automatic flow control mechanism configured to enable the remote station to resume data transmission when the number of available descriptors rises above a second threshold value higher than the first threshold value (claims 15, 16);

-the automatic flow control mechanism configured to automatically request a remote station in the data network to suspend data transmission when the number of available descriptors falls below a

preprogrammed threshold value (claim 17); and

-enabling the remote station to resume data transmission when the number of receive descriptors rises above a second preprogrammed threshold level (claim 20).

As discussed above, neither Chong nor Fox teaches or suggests providing flow control based on descriptor management.

Hence, the Examiner has failed to establish a *prima facie* case of obviousness with respect to claims 12-17, 19 and 20. Therefore, the rejection of these claims under 35 U.S.C. 103 is improper.

REJECTION OF CLAIMS 18 AND 21

Dependent claims 18 and 21 are defined over the prior art at least for the reasons presented above in connection with respective independent claims 12 and 19. Moreover, the applied reference combination is not sufficient to suggest enabling the remote station to resume data transmission after a preprogrammed time interval, if the number of receive descriptors is not less than a preprogrammed threshold level (claim 21) because none of the applied references teaches or suggests this feature.

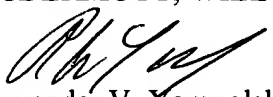
Accordingly, the rejection of claims 18 and 21 under 35 U.S.C. 103 is improper.

IX. CONCLUSION

For the reasons advanced above, Appellant respectfully contends that the rejections of claims 1, 4-21 as being obvious under 35 U.S.C. § 103 are improper as the Examiner has not met the burden of establishing a *prima facie* case of obviousness.

Respectfully submitted,

MCDERMOTT, WILL & EMERY



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X. APPENDIX

1. A computer system comprising:

a local bus,

a host processor coupled to the local bus,

a network interface for providing an interface between the local bus and a network medium, and

a memory coupled to the local bus, the memory having receive buffers allocated for receiving data from the network medium,

the network interface including an automatic flow control mechanism for automatically controlling a flow of data from the network medium based on availability of the receive buffers,

wherein in a first flow control mode initiated when a flow control mode signal is at a first logic level, the automatic flow control mechanism is configured to respond to a shortage of the receive buffers by automatically requesting a remote transmitter coupled to the network medium to suspend data transmission until a predetermined number of the receive buffers is available, and

in a second flow control mode initiated when the flow control mode signal is at a second logic level, the automatic flow control mechanism is configured to respond to a shortage of the receive buffers by automatically requesting the remote transmitter coupled to the network medium to suspend data transmission for a predetermined time.

Claims 2-3 (cancelled).

4. The computer system of claim 1, wherein the network interface comprises a descriptor management unit for managing receive descriptors pointing to the receive buffers.

5. The computer system of claim 4, wherein the automatic flow control mechanism is configured to detect availability of the receive buffers by monitoring the number of available descriptors pointing to the receive buffers available for receiving data from the network medium.

6. The computer system of claim 5, wherein in the first flow control mode, the automatic flow control mechanism is configured to automatically request the remote transmitter to suspend data transmission when the number of available descriptors falls below a first threshold value.

7. The computer system of claim 6, wherein in the first flow control mode, the automatic flow control mechanism is configured to enable the remote transmitter to resume data transmission when the number of available descriptors rises above a second threshold value.

8. The computer system of claim 7, wherein the second threshold value is higher than the first threshold value.

9. The computer system of claim 5, wherein in the second flow control mode, the automatic flow control mechanism is configured to automatically request the remote transmitter to suspend data transmission when the number of available descriptors falls below a preprogrammed threshold value.

10. The computer system of claim 9, wherein in the second flow control mode, the automatic flow control mechanism is configured to enable the remote transmitter to resume data transmission after a preprogrammed time interval, if the number of available descriptors is not less than the

preprogrammed threshold value.

11. The computer system of claim 5, wherein the network interface is configured to store information indicating a read pointer of the host processor that points to a next descriptor that should be processed by the host processor after a current receive buffer is read by the host processor.

12. A network interface device for providing an interface between a data network and a computer system, the network interface device comprising:

a descriptor management unit for managing receive descriptors pointing to receive buffers allocated to receive data from the network medium, and

an automatic flow control mechanism for automatically performing flow control in accordance with the number of available receive descriptors pointing to the receive buffers available for receiving data from the network medium.

13. The network interface of claim 12, wherein the receive buffers are arranged in a memory of the computer system.

14. The network interface device of claim 12, wherein the automatic flow control mechanism is configured to automatically request a remote station in the data network to suspend data transmission when the number of available descriptors falls below a first threshold value.

15. The network interface device of claim 14, wherein the automatic flow control mechanism is configured to enable the remote station to resume data transmission when the number of available

descriptors rises above a second threshold value.

16. The network interface device of claim 15, wherein the second threshold value is higher than the first threshold value.

17. The network interface device of claim 12, wherein the automatic flow control mechanism is configured to automatically request a remote station in the data network to suspend data transmission when the number of available descriptors falls below a preprogrammed threshold value.

18. The computer system of claim 17, wherein the automatic flow control mechanism is configured to enable the remote station to resume data transmission after a preprogrammed time interval, if the number of available descriptors is not less than the preprogrammed threshold value.

19. A method of automatic flow control in a network interface between a data network and a computer system. the method comprising the steps of:

monitoring the number of receive descriptors pointing to buffers in the computer system available for receiving data from the network, and

automatically requesting a remote station in the data network to suspend data transmission when the number of receive descriptors falls below a first preprogrammed threshold level.

20. The method of claim 19, further comprising the step of enabling the remote station to resume data transmission when the number of receive descriptors rises above a second preprogrammed threshold level.

21. The method of claim 19, further comprising the step of enabling the remote station to resume data transmission after a preprogrammed time interval, if the number of receive descriptors is not less that the first preprogrammed threshold level.